



ProDAQ

Hardware Manual

ProDAQ 3042

Embedded Slot-0 Controller

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1. Overview

The ProDAQ 3042 high-performance Slot-0 Controller provides a powerful, fully customizable platform for embedded applications. Using Motorola's newest PowerPC embedded single board computer series MVME5100, and Bustec's ProDAQ 3040 6U VME64x to C-Size VXIbus adapter, it provides the computational power and bandwidth for algorithmic- and throughput-intensive control, test and data acquisition applications.

Motorola's MVME5100 single board computer series uses the newest PowerPC generation (G4 with AltiVec™ technology) and the new PowerPlus II architecture.

The MPC7410 is a high-performance, low-power implementation of the fourth generation (G4) of PowerPC microprocessors from Motorola. The MPC7410 implements the full PowerPC 32-bit architecture and is targeted at both portable and computing systems applications. Using Motorola's AltiVec™ technology, it integrates traditional scalar processing with a fully independent vector-processing engine.

The new PowerPlus II architecture provides memory performance of up to 582MB/s memory read bandwidth and 640MB/s burst write bandwidth as well as full PCI throughput of 264MB/s.

The ProDAQ 3040 6U VME64x to C-Size VXIbus Adapter allows the usage of 6U VMEbus boards in a C-Size VXIbus system. It translates VMEbus cycles into VXIbus cycles and vice versa. In addition it houses the extensions necessary for VXIbus devices, as there are the configuration registers, a trigger and extended interrupt interface, MODID support and the 10 MHz clock generation.

It forwards all VME master cycles transparently to the VXIbus, allowing a VMEbus master the full access to the VXIbus. On the VXIbus it allows the full integration of the module in the VXIbus resource management by providing a set of VXIbus compatible configuration registers and a configurable translation window in the VXIbus A24 or A32 address space. Accesses to this translation window are forwarded to the VMEbus module's A16, A24, A32 or CR/CSR space.

Programmable interrupt, trigger and MODID support (both detection and generation), 10 MHz clock generation and auto-Slot0 detection allow the board to be used as an embedded controller in Slot-0 and non-Slot-0 applications.

2. Related Documents

Bustec Production Ltd Documents:

Title	Motorola Publication Number
ProDAQ 3040 6U VME64 to C-Size VXI Adapter Hardware Manual	3040-XX-HM

Motorola Computer Group Documents:

Title	Motorola Publication Number
MVME5100 Single Board Computer Installation and Use	V5100A/IH
MVME5100 Single Board Computer Programmer's Reference Guide	V5100A/PG
PPCBug Firmware Package User's Manual	PPCBUGA/UM
PPCBug Diagnostics Manual	PPCDIAA/UM

3. Installation and Preparation

3.1 Overview

The ProDAQ 3042 interfaces with the VXIbus via its P1 and P2 connectors and contains two IEEE 1386.1 PCI mezzanine card (PMC) slots. It is user-configurable by setting on-board jumpers.

3.2 Unpacking

Before unpacking the ProDAQ module, check the exterior of the shipping carton for any signs of damage. All irregularities should be noted on the shipping bill.

The ProDAQ module is shipped in an antistatic package to prevent any damage from electrostatic discharge (ESD). Proper ESD handling procedures must always be used when packing, unpacking or installing any ProDAQ module, PMC module or similar:

- Ground yourself via a grounding strap or similar, e.g. by holding to a grounded object.
- Discharge the package by touching it to a grounded object, e.g. a metal part of your VXIbus chassis, before removing the module from the package.
- Remove the ProDAQ module from its carton, preserving the factory packaging as much as possible.
- Inspect the ProDAQ module for any defect or damage. Immediately notify the carrier if any damage is apparent.

3.3 Hardware Preparation

The ProDAQ 3042 comes factory configured for operating as a VXIbus Slot-0 controller with the Motorola PPCbug debugger installed. Depending on the application it might be necessary to change this configuration.

The ProDAQ 3042 provides software control over most of its configuration options by setting bits in control registers. For additional information, please refer to the *MVME5100 Single Board Computer Programmer's Reference Guide* and the *ProDAQ 3040 6U VME64x to C-Size VXIbus Adapter Hardware Manual*.

Some options are not software-programmable but controller by manual installation or de-installation of jumpers. The following table lists the manually configured jumpers on the ProDAQ 3042 and their default settings.

Jumper	Description	Setting	Default
J1	RISCWatch header	None (factory use only)	---
J2	PAL programming header	None (factory use only)	---
J4	Ethernet port 2 selection	None (Only front panel connector supported)	---
J6, J20	Operation mode	None (SBC mode not supported)	---
J7	Flash memory selection	Pins 1,2 – soldered Bank A Pins 2,3 – socketed Bank B	Bank B
J10, J17	Ethernet port 2 selection	None (Only front panel connector supported)	---
J15	System Controller	None (Automatically detected by ProDAQ 3040 adapter)	---
J16	Soldered Flash protection	Pins 1,2 – programming enabled Pins 2,3 – programming disabled	prog. enabled

NOTE: The settings described here supersede the settings as described in the manual *MVME5100 Single Board Computer Installation and Use*. due to special considerations for using the MVME5100 series board together with the ProDAQ 3040 adapter.

3.4 Installation

3.4.1 PMC modules

PMC modules mount on top of the MVME5100 single board computer part of the ProDAQ 3042. Please refer to the *MVME5100 Single Board Computer Installation and Use* manual for the steps necessary to install a PMC module on your board.

3.4.2 ProDAQ 3042

Before installing the ProDAQ 3042 into your VXIbus mainframe, ensure that the jumpers are configured properly, any optional PMC modules are installed and the module enclosure is assembled properly.

Perform the following steps to install the ProDAQ 3042 in your mainframe:

1. Attach an ESD strap to your wrist. Attach the other end of the ESD strap to an electrical ground. The ESD strap must be secured to your wrist and to ground throughout the whole procedure.
2. If necessary, perform an operating system shutdown on any computer effected by the installation. Turn the AC or DC power off and remove the AC or DC power lines from the system. Remove mainframe or system cover(s) as necessary to access the VXIbus slots.
3. Remove filler panels from the selected slot if necessary. If you intend to use the ProDAQ 3042 as slot-0 controller, it must occupy the left-most VXIbus slot in the system (slot "0"). If you do not intend to use it as slot-0 controller, you may install it into any other free slot in your mainframe.

4. Slide the ProDAQ 3042 into the selected slot. Verify that the module is seated properly in the P1 and P2 connectors on the backplane. Do not damage or bend connector pins.
5. Secure the ProDAQ 3042 in the mainframe with the screws in the top and bottom of its front panel and verify proper contact with the traverse mounting rails.
6. If your mainframe does not have an auto-jumpering feature for the automatic propagation of the IACK and BG signals, you might need to set or remove jumpers on the backplane to allow the proper handling of these signal lines. Refer to your mainframe documentation for more information.
7. If you want to use the factory installed debugger interactively, connect the terminal that is to be used as the debugger system console to the DEBUG port on the front panel of the ProDAQ 3042.
8. Replace mainframe or system cover(s) and cable peripherals to the panel connectors as required.
9. Reconnect the system to the AC or DC power source and turn the system power on.

4. Operation

4.1 Front-Panel Connectors

There are three connectors located on the ProDAQ 3042 front panel, two 10/100 BaseT Ethernet connectors labeled LAN1/LAN2 and one serial port labeled DEBUG.

4.1.1 10/100 BaseT Ports

The two RJ-45 ports labeled LAN1/LAN2 provide the 10BaseT or 100BaseTX Ethernet LAN interface. A standard CAT5 network cable with RJ-45 connectors can be used to connect the ProDAQ 3042 to your LAN.

Pin	Assignment
1	TD+
2	TD-
3	RD+
4	AC Terminated
5	AC Terminated
6	RD-
7	AC Terminated
8	AC Terminated

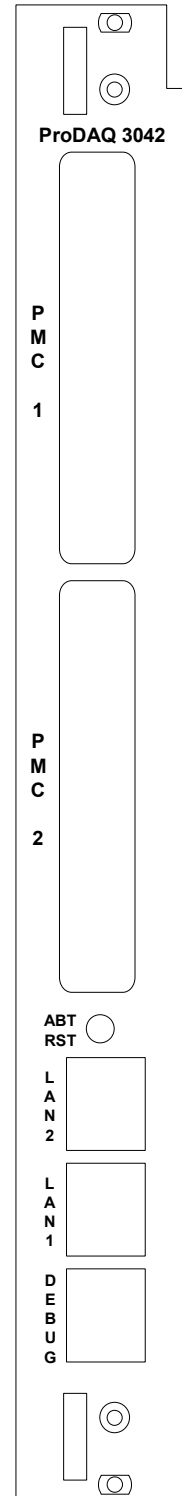
Figure 1 - LAN Connectors Pin Assignment

4.1.2 DEBUG Port

The RJ-45 port labeled DEBUG provides an RS-232 serial interface, based on a TL16C550 UART controller chip. It is asynchronous only. This port may be used to connect a terminal to the ProDAQ 3042 to serve as a console for the installed firmware or operating system. By default the port is configured for a baud rate of 9600 baud, 8 bits per character, 1 stop bit per character and no parity.

ProDAQ 3042		DTE (PC etc.)	
Pin	Assignment	Pin	DB-9
1	DCD	4	DTR
2	RTS	8	CTS
3	GND	5	GND
4	TXD	2	RXD
5	RXD	3	TXD
6	GND	n.c.	
7	CTS	7	RTS
8	DTR	1	DCD

Figure 2 - DEBUG Connector and Cable Pin Assignment



4.2 Front-Panel Switches

The front panel of the ProDAQ 3042 incorporates a dual function toggle switch labelled ABT/RST.

4.2.1 ABT/RST Switch

The ABT/RST switch causes an interrupt signal to be generated. This interrupt is normally used as an “Abort” signal for the processor to abort program execution and return control to the debugger firmware. If pressed for more than five seconds, the “Reset” function is selected and all on-board devices are reset. If the board is located in slot-0 and functions as a slot-0 controller a SYSRESET# signal is generated.

Note: The dual functionality of the Abort/Reset switch depends on the installed firmware. If a different firmware than the factory installed Motorola PPCbug debugger is installed, the reaction on the ABT/RST switch depends on this firmware.

4.3 Logical Address Switch

The ProDAQ 3042 Slot-0 Controller can operate as either a Slot-0 controller or as an embedded VXIbus controller (non-Slot-0). When the ProDAQ 3042 is operated as the Slot-0 controller, it must be located in the left-most slot (slot “0”) of a VXIbus System Specification Rev 1.3 (or higher) compatible VXIbus mainframe and be set for logical address zero (0). If the ProDAQ 3042 is operated as an embedded VXIbus controller (non-Slot-0), it may be located in any other slot and the logical address can be set to any value between 1 and 255.

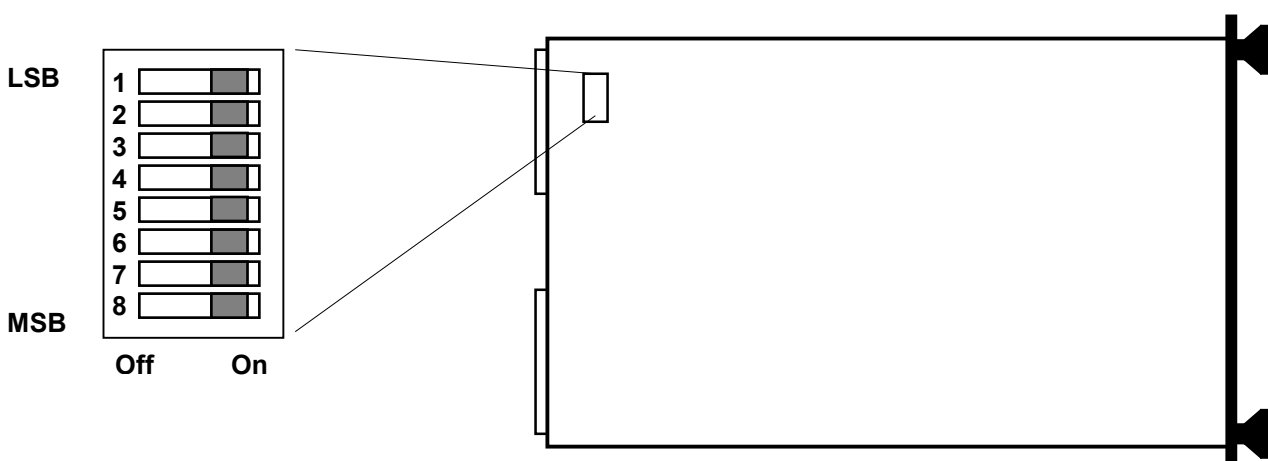


Figure 3 - Logical Address Switch Location

Figure 3 shows the location of the logical address switch on the ProDAQ 3042. Set each switch to 'Off' for a logical one (1) and to 'On' for a logical zero (0). The picture shows the address switch set to logical address zero (0).

If the ProDAQ 3042 is used in a non-slot-0 position, it can be either statically or dynamically configured. To configure it statically, the logical address switch must be set to a value between 1 and 254. This determines the logical address of the module permanently and can only be altered by changing the setting of the logical address switch. To configure the ProDAQ 3042 dynamically, the logical address switch must be set to 255. The resource manager will use the VXIbus MODID lines to access and configure the board, and assigns a logical address during run-time.

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